

NEW UNDERGROUND HYDROCARBON STORAGE WELL/CAVERN FINAL PERMIT APPLICATION

In conformity with the provision of K.S.A. 55-1,117 through K.S.A. 55-1,119, and K.A.R. 28-45-2a through K.A.R. 28-45-30, the undersigned, representing

(Name of company, corporation or person applying)

hereby makes application to the Kansas Department of Health and Environment for a permit to create and operate underground hydrocarbon storage wells described below in Part II. This application shall be signed by an executive officer of a level of at least Vice-President. A signature statement is attached.

Part I for a new well at a new facility should be completed and submitted with Part II.

Part I for a new well at an existing facility should be updated and referenced by Part II.

Part II should be completed for each cavern.

PART I – FACILITY

A. Maps

Information for maps A1 through A4 may be submitted on separate maps or on one map. The maps should be drawn to scale.

1. Provide a map that shows that the boundaries of the facility are located at least:
 - ☐ three miles from the boundaries of municipal population centers
 - ☐ five miles from an active or abandoned conventional shaft mining operation
 - ☐ two miles from any solution mining operation
 - ☐ one mile from an existing underground porosity storage facility
2. Provide a map of the following features or structures located within one mile of the storage facility's perimeter:
 - ☐ existing and proposed underground hydrocarbon storage wells, water supply wells, oil field wells, gas wells, brine production wells, disposal wells, monitoring wells, abandoned wells, dry holes, and core holes
 - ☐ surface water bodies, brine retention ponds, and springs
 - ☐ existing and proposed pipelines, mines, quarries
 - ☐ faults and other pertinent surface structures

3. Provide a map showing all utilities having right-of-way, including pipeline, railway, roadway, and electrical lines. In addition, assess the potential effects of the identified utilities on the location or operation of the storage facility.

4. Provide a map indicating the boundaries and ownership of tracts of land adjacent to the facility.

- Include with the map a list containing the names and mailing addresses of property owners adjacent to the facility boundaries that are keyed to the map.
- Demonstrate that the distance of the proposed cavern's outer boundary will be greater than 100 feet from:
 - the property boundary of owners who have not consented to underground storage beneath their property
 - any existing surface structure not owned by the applicant
 - any transportation artery

B. Well Information

Provide a tabulation of data on all wells penetrating the salt section within one mile of the storage facility. These wells should be keyed to the map A2.

- the type of well
- well's current status
- construction details, if known
- construction date, if known
- location
- total depth, if known
- any plugging or completion data

C. Geology/Hydrogeology

Provide a report prepared by a licensed geologist that includes:

- an evaluation of the geology and hydrogeology supported with:
 - isopach and structure maps of the salt formation
 - water-level or potentiometric maps
- a cross section showing:
 - aquifers
 - local stratigraphy
- a regional stratigraphic map
- a regional geological evaluation, prepared by a licensed geologist, describing any potential adverse impact on the storage cavern from:
 - salt thinning due to any change in stratigraphy
 - a dissolution zone in the bedded salt
- local and regional structural analyses, including maps, cross-sections and available geophysical data
- an assessment of the potential for ground subsidence
- a description of potential risks to the storage operation from activities conducted at adjacent facilities
- a core analysis for the facility

D. Operations and Maintenance Plan

Submit a long-term operations and maintenance plan for the facility. The plan should include the following:

- a facility location map showing boundaries, location of existing and proposed underground storage wells, existing and proposed pipelines for each cavern, brine retention ponds, surface structures, shallow and deep groundwater observation wells, water supply wells, and disposal wells (Map A2)
- a schematic of the gathering line system that connects all wells
- a schematic of brine and product lines for each cavern
- a description of methods to be used to prevent over-pressuring of wells and caverns
- design information and plans for holding tanks, separators, lines, pumps, filters, and other equipment used in the storage operation at the facility
- a quality assurance/quality control (QA/QC) plan outlining the steps to be taken (such as calibrating and certifying gauges) to assure readings are accurate and reliable for:
 - continuous pressure monitoring equipment
 - supervisory control and data acquisition (SCADA) system(s)
 - system(s) used to measure the volume of hydrocarbons injected into or withdrawn from an underground storage well
- plans and diagrams for emergency control and spill containment structures used to prevent surface and subsurface contamination in emergency situations
- a description of the containment and remediation methods to be used if usable water or soils become contaminated.
- a list of the permit numbers for the brine ponds at the facility.
- a contingency plan for the disposal of excess brine.

E. Emergency Response Plan

Submit an emergency response plan:

- Describe the facility's proposed response to the following events:
 - spills and releases
 - fires or explosions
 - cavern subsidence or collapse
 - any other activity that endangers public health, safety, or constitutes a threat to the environment
- The plan should include:
 - a description of the warning systems for the facility
 - a description of emergency response procedures
 - a description of the communication system for emergency response
 - a description of employee training for emergency response
- Provide a description of the facility's protection against accidental damage from hazards such as vehicular traffic, railroads, electrical power lines, aircraft, or shipping traffic.
- Provide a description of security measures to prevent unauthorized entry and to secure the facility.

F. Groundwater Monitoring Plan

Submit a groundwater monitoring plan

- a description of the monitoring wells
 - a map, to scale, showing the monitoring well locations
 - a tabulation showing each well's total depth and screened interval
 - the geologic formations at total depth and at the screened interval
- a quality assurance plan with a description of sampling and analysis techniques
- a monitoring plan for obtaining quarterly chloride samples, monthly combustible gas readings, and quarterly static water level measurements
- a plan for collecting, describing, and logging well cuttings from any new monitoring well or stratigraphic test hole as specified in KDHE's "Procedures for Sample Logging" (UICLPG-9)

G. Ground Subsidence Monitoring Plan

Submit a plan for monitoring ground subsidence at the storage wells. Identify the permanent benchmark and describe the criteria used to establish this point as a permanent benchmark

H. Proof of financial assurance

Provide proof of financial assurance for closure of the storage facility and the plugging of any underground hydrocarbon storage well.

I. Annual Report

Submit the annual report for the facility which is due on or before April 1 of each year.

PART II – UNDERGROUND HYDROCARBON STORAGE WELL/CAVERN

INFORMATION

- **I certify that all information in Part I of this application is true and applicable as it pertains to Well _____.**
Well identification

Table 1:

Well Identification			Status
Global positioning system coordinates			
US Public Land Survey System			
Section	Township	Range	Quarters

Table 2:

Open-Hole Requirements: (specified or other approved)				
Gamma log	Neutron or sonic	Density	Caliper	Sample cuttings
Type	Type	Type	Type	Sampling interval: Wet sample set: Dry sample set:
Date	Date	Date	Date	
Groundwater samples from water bearing formations:				
Interval:	Date:	Lab:		

Table 3:

Well Information				Required double casing and new steel casing		
*Surface casing material	Surface casing size	Surface casing weight	Total depth surface casing	**Design for maximum pressures		
				Collapse	Burst	Tensile
Intermediate casing material	Intermediate casing size	Intermediate casing weight	Total depth intermediate casing	**Design for maximum pressures		
				Collapse	Burst	Tensile
Production casing material	Production casing size	Production casing weight	Total depth production casing	**Design for maximum pressures		
				Collapse	Burst	Tensile
Tubing material	Tubing Size	Tubing weight	Total depth tubing	**Design for maximum pressures		
				Collapse	Burst	Tensile
Description of tubing and packer assembly (if present, and include design pressures)						
Description of weep hole						
Has the integrity of the casing been verified?			<input type="checkbox"/> Certification for the compatibility of the stored product, ground water, blanket material, brine, formation fluids, drilling fluids, and any test materials.			
Verification methods:						
Casing evaluation log type:						
Log date:						
Mechanical integrity test type:						
Test date:						
Cement bond log:						
Log date:						
<input type="checkbox"/> Submit a well construction diagram showing casings, tubing, and wellhead instrumentation						

* Surface casing requirements in K.A.R. 28-45-14

**Performance standards for casing and tubing are specified in API Bulletin 5C2 (§16).

Table 4:

Cement Information					
Surface Casing		Interval:			
Type and grade:	Cement additives:	Slurry weight:	Compressive strength:	Number of sacks of cement:	Cemented interval:
Pressure testing (Method, date, etc.):			Cement bond log (type and date):		
Intermediate casing:		Interval:			
Type and grade:	Cement additives:	Slurry weight:	Compressive strength:	Number sacks of cement:	Cemented interval:
Pressure testing (method, date, etc.):			Cement bond log (type and date):		
Production casing:		Interval:			
Type and grade:	Cement additives:	Slurry weight:	Compressive strength:	Number sacks of cement:	Cemented interval:
Pressure testing (method, date, etc.):			Cement bond log (type and date):		
Casing inspection base log on innermost casing string:					
Type inspection log:			Log date:		
Cement program: <input type="checkbox"/> Describe cementing technique (equipment) <input type="checkbox"/> Process for cement evaluation (cement samples and tests)					

Table 5:

Cavern Development
Description of containment for drilling fluids and formation cuttings:
Description of solutioning or washing method (process, compatibility of fluids, blanket material, etc.):
Description of monitoring for washing process:

Table 6:

Cavern Completion:					
Completion date:		Sonar Date:			
		Maximum diameter	Cavern height	Capacity	
Gamma-density					
Date:	Salt top:	Cavern top:	Salt roof thickness:		
Integrity Tests					
Nitrogen-brine		Hydrostatic brine		Other	
Date:	Pass/fail	Date:	Pass/fail	Date:	Pass/fail
Inspection date:			Commissioning date:		

Table 7:

Operations	
Type product stored	Date
Maximum allowable operating pressure	Depth to casing seat _____ ft
	Gradient 0.75 ft or 0.80 psi/ft
	Calculated fracture pressure
Maximum operating pressure	Minimum operating pressure

Table 8:

Wellhead Instrumentation		
Emergency Shutdown Valves (ESD)		
Brine line: Rating: Date Installed:	Product line: Rating: Date Installed	Water line: Rating: Date Installed
Does ESD fail to a closed position?		
Does it automatically close all inlet and outlets to the cavern?		
Is it capable of remote and local operation?		
Manual isolation valves:	Rating:	Date installed:
Warning Systems		Connected to Alarm (yes or no)
Hydrocarbon flow indicators		
Combustible gas indicator		
Pressure transducers	Brine side	
	Product side	

Well identification:

Indicate the scheduled completion date for the actions listed by placing an “X” in the appropriate box.

Table 9:

[illegible]

